

The Prevalence of Diurnal Urinary Incontinence and Enuresis and Quality of Life: Sample of School

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Purpose: Enuresis can cause loss of self-esteem in children, change relations with family and friends, and decrease the school success. This study was conducted to determine the prevalence of urinary incontinence (UI) in school children aged between 11-14 years and identify the emotions and social problems of enuretic children.

Materials and Methods: A mixed methods approach was used on a group of students who reported UI by combining quantitative data from school population-based cross-sectional design with qualitative data using in-depth interview techniques. The data of this descriptive and cross-sectional study were collected from 2750 primary school students aged between 11-14 years in Istanbul.

Results: The overall prevalence of UI was 8.6% and decreased with age. Prevalence of the diurnal enuresis in children was 67.9% and all of them had non-monosymptomatic enuresis. 83.3% of the children were identified with secondary enuresis for 1-3 years. UI was significantly more common in boys and those who had frequent urinary infections, whose first degree relatives had urinary incontinence problem in childhood, and who reported low socioeconomic level in the family. The emotional and social effects of urinary incontinence were given in the context of children's own expressions.

Conclusion: Urinary incontinence is an important problem of school-age children. In this study the prevalence of UI was found to be 8.6%, diurnal UI and secondary enuresis were very common, and all of the children were non-monosymptomatic. Enuresis has negative emotional and social effects on children.

Keywords: child; urinary incontinence; enuresis; epidemiology; quality of life; risk factors; schools.

INTRODUCTION

Urinary incontinence is the involuntary leakage of urine that may occur as "continuous" or "intermittent". Intermittent incontinence is the leakage of urine in discrete amounts. The subgroups of intermittent incontinence are diurnal incontinence and enuresis. Diurnal incontinence occurring while the person is awake is identified as intermittent incontinence⁽¹⁾. Enuresis is among the most common conditions in childhood⁽²⁾. The International Children's Continence Society defines enuresis as bed-wetting while asleep/nocturnal incontinence after five years⁽¹⁾. The enuresis has two types. The non-monosymptomatic enuresis is characterized by symptoms of diurnal incontinence, sudden jamming, incontinence before catching up on the toilet, and intermittent voiding and straining during voiding and nocturnal enuresis. The nocturnal incontinence without other symptoms is defined as "monosymptomatic enuresis". The primer enuresis is described as the fact that the child has never been able to control urine. The secondary enuresis signifies that the child had controlled urine for at least 6-month dry period after 5 years of age. It is important to identify enuresis type for management^(1,3).

Primary enuresis accounts for 80-90% of all enuretic cases⁽⁴⁾, toilet training is never achieved, and genetic

disposition and biological and developmental factors play a major role⁽³⁾. In secondary enuresis, the child resumes wetting after at least six months of dryness. Secondary enuresis is suggested to be often triggered by psychological factors^(3,4).

Related studies have revealed that the prevalence of intermittent incontinence is 3.2-9.0 % and the prevalence of diurnal incontinence is 1.8-9.0 % among 7 year-old children. The prevalence of intermittent incontinence is 1.1-12.5 % and the prevalence of diurnal incontinence is 0.9% in 11-13 year old children⁽⁵⁾.

Studies have showed that 5-7 million children aged 7 or over are affected by enuresis and its prevalence increases in boys and with family history of enuresis⁽⁶⁾. It is reported that prevalence decreases with age^(6,7) and decreases to 1-3% at the age of 15⁽⁸⁾. While enuresis does not result in serious physical discomfort in childhood, it is a problem with adverse effects on the quality of life among many children and their parents due to its social and psychological results^(9,10).

The aim of this study was to determine the prevalence of diurnal UI and enuresis in children aged between 11-14 years and evaluate the emotional and social effects of enuresis on a group of students, who reported enuresis, by using in-depth interview methods.

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Received May 2017 & Accepted November 2017

Table 1. Distribution of UI Characteristics of children (N=2750).

Characteristics	n	%
Urinary incontinence		
No	2513	91.4
Yes	237	8.6
Time of UI		
Day time	161	67.9
Nighttime	40	16.9
Day and night	36	15.2
Primer enuresis	29	34.9
Secondary enuresis	54	65.1

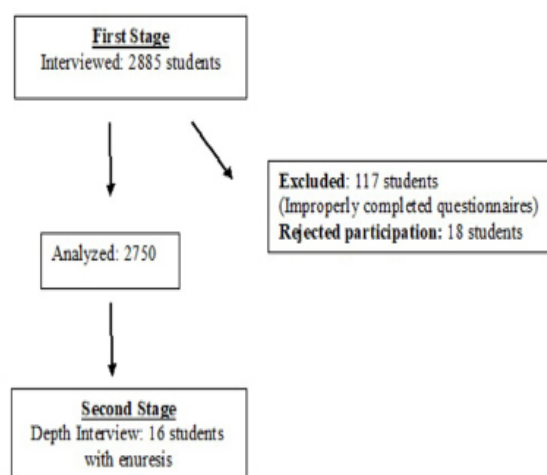
MATERIALS AND METHODS

Study design

This is a mixed methods study. The data were collected using “descriptive questionnaire form” for the first stage of this descriptive and cross-sectional study. For the study, written approvals were obtained from the Ethics Committee of IU (IRB approval number: 26211); the Governorship of city; and the Provincial National Education Authority (IRB approval number: 120). In the second stage, the data were collected from primary enuresis cases who reported UI, were voluntary to participate in the study, and met DSM-V diagnosis criteria for enuresis, which is among qualitative research methods⁽¹¹⁾.

The Population of the Study

The population of the study consisted of the 5th, 6th, 7th and 8th-graders of public primary schools in Istanbul. The sample size of the study was determined by using the calculation formula of the sample size ($n = t^2 \times P \times q/d^2$). Prevalence (P) was taken 13%⁽¹²⁾ as a mean value, acceptable sampling error was $d = .03$, and minimum sample size was determined as $n = 483$ for each grade. It was determined that a total of 1932 students must be contacted for the sample group, as a minimum requirement. The cluster sampling method for simple randomization was used to determine the schools where the data would be collected. Each school was considered a cluster and the mean number of students in each grade of primary schools located in Istanbul was assumed to be 30. When taking any possible data loss into consideration,

**Figure 1.** Flow diagram of the study

it was ascertained that it was required to include students from 73 classes (target number-2200 / 30-size of class) and those 73 classes must be selected from 18 primary schools. In the first stage, 18 districts were chosen out of 32 districts in Istanbul by drawing lots. The data were collected from the students studying in branch A of 5th, 6th, 7th and 8th grades of 18 schools (**Figure 1**). First stage: The questionnaire was distributed to the students in each of the designated schools within the same day and was completed in a classroom setting. All voluntary students were enrolled in the study. Evaluation was made over 2750 forms. The forms were filled by voluntary students in the classroom except for the course.

Second stage: The effect of enuresis on the quality of life was evaluated using in-depth interview technique as a qualitative research method on a group of students who reported enuresis. The interviews were conducted by one of the researchers with 16 students reporting UI in a quiet room at the school by incorporating themes associated with enuresis-related emotional and social problems in children. Among these 16 students who were interviewed, 11 were girls and 5 were boys.

Data collection

After the questionnaire was prepared based on relevant literature and submitted to 6 faculty members for remarks to ensure the content validity, a pilot study was conducted with 20 students from 5th, 6th, 7th and 8th grades and the questionnaire was finalized.

The questionnaire including a total of 37 questions was designed to obtain information about sociodemographic characteristics of the students. The questionnaire involves the students' age, gender, class, parents' educational level, income level of family, individuals with whom they lived together, number of siblings. In terms of general health; diseases, medications, smoking, constipation, fluid intake, the habit of going to the toilet, urinary complaints, and the presence of urinary incontinence are asked. The effect of urinary incontinence on daily life is evaluated by the Visual Analogue Scale. During in-depth interviews, semi-structured questionnaire was used. The interviews were recorded on tape and then transcribed. This questionnaire involved 5 basic questions. These questions were as follows: what do you feel because of enuresis?, what do you do when you recognize leakage of urine?, what do you do to cope with UI?, Does UI affect the daily life?, and how do the surroundings react to UI?

Statistical analysis

The data were analyzed by using SPSS 22.0 packaged software. The value of $P < .05$ was considered as statistically significant. Mean, SD, percentage, Pearson's chi-square test, and logistic regression analysis were used for analysis. Audio records of the in-depth interviews were transcribed and coded, and descriptive and content analyses were used. The collected data were divided into two thematic groups.

RESULTS

The data gathered through the questionnaire

The mean age of 2750 children was 12.53 ± 1.12 (range: 11-14), 50.3% were boys and 26.3% were 14 years old. It was found that 43.1 % of the mothers of the children were primary school graduates and 76.9 % were unemployed. 33.8 % of their fathers were prima-

Table 2. Comparison of urinary incontinence data within the sample group by demographic and other characteristics (N = 2750).

Characteristics	Incontinent		Continent		*P-value
	n	%	n	%	
Age					
11	73	30.8	574	22.8	
12	63	26.6	654	26	< .001
13	60	25.3	603	24	
14	41	17.3	682	27.2	
Gender	99	41.8	1267	50.4	.01
Female					
Male	138	58.2	1246	49.6	
Mother's educational level					
Illiterate	26	11.2	128	5.1	
Literate	15	6.4	76	3.1	
Primary school	105	45.1	1079	43.4	< .001
Secondary school	30	12.9	409	16.4	
High School	45	19.2	574	23.1	
College	12	5.2	221	8.9	
Father's educational level					
Illiterate	7	3	23	.9	
Literate	10	4.3	71	2.9	
Primary school	86	36.9	844	34.1	< .001
Secondary school	58	24.9	473	19.1	
High School	43	18.5	705	28.5	
College	29	12.4	360	14.5	
Income status of family					
High	101	42.6	1314	52.4	
Middle	103	43.5	1113	44.4	< .001
Low	33	13.9	79	3.2	
Previous year's school performance					
High (certificate of merit/achievement)	135	57	1646	65.5	< .001
Medium (pass)	77	32.5	727	29	
Low (conditional pass/repeat)	25	10.5	138	5.5	
Mother's employment status					
Employed	72	30.8	552	22	< .001
Unemployed	162	69.2	1952	78	
Lives with					
Both parents	207	87.3	2341	93.2	
One of the parents	18	7.6	112	4.5	< .001
Other family members	12	5.1	58	2.3	
Immediate family history					
Yes	107	45.1	-	-	< .001*
No	130	54.9	2513	100	

P = Pearson's chi-squared test * Fisher's exact test

ry school graduates and 51.5 % of the families stated that their income status was high. 92.7 % of the students were living together with their both parents. The most of the students had a high school performance in previous year (67.8 %). It was found that there was no statistically significant difference within the study group in terms of distribution of gender ($P = .73$) and age ($P = .09$).

Table 1 shows the incidence of urinary incontinence of the participants. It was determined that 8.6% of the children had UI based on their own personal statements. All participants in enuresis group were non-monosymptomatic. It was determined that 83.3% of the children with enuresis had secondary enuresis for 1-3 years.

Table 2 shows the comparison of urinary incontinence data within the sample group by demographic and other

characteristics. As is seen from **Table 2**, there was a statistically significant decrease in the prevalence of enuresis with age ($P < .001$), enuresis was more common among males ($P = .01$), and the number of enuretic children was statistically significantly higher than expected in children of mothers ($P < .001$) and fathers ($P < .001$) with low educational level, in children whose mother was employed ($P < .001$), whose school performance was low ($P < .001$), and whose family income status was low ($P < .001$). The number of enuretic children was lower in the group of children living with their both parents ($P < .001$). In addition, it was determined that the prevalence of childhood enuresis was significantly high ($P < .001$) in the immediate family of children who reported urinary incontinence.

As is seen in **Table 3**, it was determined that enuresis

Table 3. Distribution and comparison of urinary incontinence by some characteristics (N = 2750).

Characteristics	Incontinent		Continent		*P-values
	n	%	n	%	
Frequent urinary infection					
Yes	24	10.1	60	2.4	< .001
No	213	89.9	2453	97.6	
Constipation					
Yes	60	25.3	149	5.9	< .001
No	177	74.7	2364	94.1	
The use of school toilet					
Yes	131	55.3	1572	62.6	.03
No	106	44.7	941	37.4	

P = Pearson's chi-square test

Table 4. Risk factors associated with urinary incontinence based on the logistic regression analysis (N = 2750).

Associated factors		B	S.E.	df.	Sig. (P)	Exp. (B)	95% CI (OR)	
							Lower	Upper
Age	14 (reference)							
	13	.72	.22	1	<.001	2.06	1.33	3.19
	12	.76	.23	1	<.001	2.13	1.36	3.35
	11	1.12	.23	1	<.001	3.05	1.96	4.75
Mother's educational level	High school and ↑ (ref.)							
	Primary	.25	.18	1	.16	1.29	.90	1.83
	L or IL*	.90	.25	1	<.001	2.46	1.51	3.99
Mother's employment status	Unemployed (ref.)							
	Employed	.44	.16	1	<.001	1.55	1.13	2.14
School performance	High (ref.)							
	Medium	.23	.17	1	.17	1.26	.91	1.75
	Low	.78	.27	1	<.001	2.19	1.29	3.70
Household	Parents together (ref.)							
	Either parent or other relatives	.65	.23	1	<.001	1.92	1.23	2.99
Income status of family	High (ref.)							
	Medium	.08	.16	1	.61	1.08	.80	1.47
	Low	1.45	.26	1	<.001	4.27	2.57	7.07
Frequent urinary infections	No (ref.)							
	Yes	.61	.29	1	.04	1.83	1.03	3.25
Constipation	No (ref.)							
	Yes	1.54	.19	1	<.001	4.66	3.21	6.77
Constant		-.50	.19	1	<.001	.61		

* L = Literate, IL = Illiterate

was more common among children who reported frequent urinary infections ($P < .001$), constipation ($P < .001$) and school toilet avoidance ($P = .03$).

In the study, a logistic regression model which contained risk factors associated with urinary incontinence in children aged between 11-14 years was prepared. **Table 4** shows the variables which posed a significant risk in the forward propagation multivariate logistic regression analysis compared to the reference. In the regression analysis, it was determined that enuresis risk was significant for younger children (3.05 times higher at the age of 11 compared to 14), children who reported lower maternal educational level (2.46 times higher compared to high school and college graduates), children of employed mothers (1.55 times higher compared to those of unemployed mothers), children with low school performance (2.19 times higher compared to those with high performance), children not living with their parents (1.92 times higher compared to those living with their parents), children from families with low income status (4.27 times higher compared to those from families with high economic status), children reporting frequent urinary infections (1.83 times higher compared to those not reporting frequent urinary infections), and children reporting constipation (4.66 times higher compared to those not reporting constipation). Mean scores of the students, who reported urinary incontinence to the question "How much does urinary incontinence affect your daily life", was 2.95 ± 2.73 (Median = 3, Mode = 0) in the Visual Analogue Scale (VAS: 0 to 10 - 0: doesn't affect at all, 10: affects pretty much). Children were grouped and evaluated as follows; those who marked 0 on the scale were not affected by urinary incontinence in daily life; those who marked 1, 2, and 3 were slightly affected; those who marked 4, 5, and 6 were moderately affected; and those who marked 7, 8, 9, and 10 were considerably affected. It was determined that two thirds of enuretic children stated that their daily life was slightly (36.1%) and moderately (25.8%) affected by enuresis.

The data on emotional effects of urinary incontinence: During the interviews, almost all of the children an-

swered the question "What do you feel when you have leakage of urine?" by using the expressions such as embarrassment, worry, downheartedness.

The data on social effects of urinary incontinence:

The majority of the children answered the question "Does your problem of urinary incontinence have any effect on your daily life? How?" by stating that their daily life was affected by this problem and they took some measures including taking a change of clothes with them and avoiding drinking water or tea etc.

DISCUSSION

Continence problems in children can persist into later childhood and have a serious effect on quality of life. Number of studies on its causes and impact is scarce and useful resources are limited⁽¹³⁾.

The statistical results obtained due to large size of the sample were thought to be significant in terms of urinary incontinence and the associated factors in the study. The review of the literature showed that data in studies conducted to identify emotions and social problems of enuretic children were usually collected from mothers^(10,14). The strength of this study is that it determined the effect of urinary incontinence on emotional and social life of children through in-depth interviews. Limitation of the study is that the data on factors thought to be associated with urinary incontinence were collected only from children. It is thought that this study is significant and original since the data of the study were collected from epidemiologic studies obtained from children, the sample size can be regarded as sufficient and emotions of the children reporting urinary incontinence were tried to be determined through in-depth interviews.

This study revealed that the prevalence of UI was 8.6%, significantly higher in boys, and decreased with age. In the study conducted by Dirim et al., with school children, they identified urine problems at the rate of 7.2%⁽¹⁵⁾. In the several studies, diurnal UI frequencies showed a difference between 1.8% and 49%⁽⁵⁾. The wide range of frequencies is associated with difference in UI definition criteria and difference in data collection

methods with different samples⁽¹⁶⁾.

Studies indicate a wide range between 3.1-24.4% for the prevalence of enuresis. Its prevalence usually seems to decrease with age and enuresis is more common among boys in early school years compared to girls^(17,18). Prevalence of enuresis was determined to be 10.5-17.5% in Turkey^(8,12). Diurnal UI was more frequent in the present study, as well.

Enuresis is a clinical condition of multifactorial etiology that leads to difficulties in social interaction of the child⁽¹⁹⁾. Many studies report that enuretic children have a family history of enuresis at a high rate (EC)^(6,20,21), and the rate of positive family history is between 40.7-76.5 in Turkey⁽²²⁾. The enuresis rate was found to be 45.1% among immediate family members in this study, which is compatible with associated literature. In the study conducted by Fagundes on treatment of 82 patients with enuresis, 91.1% had a family history of enuresis in first-/second-degree relatives, 89.3% had constipation and 40.7% had mild-to-moderate apnea⁽²³⁾.

Role of sleep disorders is controversial in enuresis^(21, 23). Wille et al.,⁽²⁴⁾ reported that 60% of EC experienced the problem of deep sleep and 75% of children with nocturnal enuresis had difficulty in waking up. Akbaba⁽²⁵⁾ determined that the prevalence of enuresis was 1.8 times greater in sound sleepers than light and moderate sleepers. One thirds (32.9%) of children who reported UI in this study stated that they wetted their bed because they were sound sleepers. Zaffanello et al., expressed that the symptoms of snoring, sleep apnea, and restless sleep were examined for the children with enuresis in their systematic review study. In the same systematic review, Zaffanello et al., suggested immediate treatment for obstructive sleep and irregular breathing⁽²⁶⁾.

It was determined that the prevalence of enuresis was 4.27 times greater in children with a low socioeconomic status than children with a higher socioeconomic status⁽¹²⁾. In addition to trials showing a higher prevalence among children of families with lower maternal educational level, there are trials which confirm the inexistence of such relation^(6,12). The incidence of enuresis was higher among mothers' educational levels in this study. The studies in the literature have shown that environmental factors including poor living conditions to which the child is exposed, suffered traumas, etc. are among psychosocial risk factors⁽¹³⁾ contributing to enuresis and enuresis is more common particularly among children of broken families^(4,17). In the present study, the prevalence of enuresis is higher among EC living with either parent/relatives compared to EC living with both parents.

It is reported that the presence of enuresis in a child creates a vicious circle of decreased self-confidence, social avoidance, and lower school performance⁽⁹⁾. In their studies involving 2984 children aged between 6-18 years, Gorur et al.,⁽²¹⁾ determined that problems in friend relationships and low school performance were significantly common in the enuretic group. Although it was reported that enuresis was accompanied by urinary tract infections and constipation⁽²¹⁾, such accompaniment was not fully clear. One study revealed that the rate of coexistence of enuresis and constipation was 31%⁽²⁷⁾, and another study determined a relationship between enuresis and urinary tract infections⁽²⁵⁾. The present study revealed higher enuresis rates in children reporting constipation and in children reporting fre-

quent urinary infections.

It is stated that EC may experience lack of self-confidence and self-esteem if they are not treated until school age when social circle widens⁽²³⁾. In this study, the result indicating that low percentage of subjects seeking medical treatment for enuresis among those who reported UI is compatible with the literature. When taking high rate of family history into consideration, this result may be interpreted as parents' being inured to and ignoring the problem.

Discussion of the data collected with in-depth interviews

Bower⁽²⁸⁾ revealed that children with UI symptoms experienced the feelings of inferiority, irritability and embarrassment more frequently, the quality of life impaired with failed treatment, and the aspects in which children are affected the most are self-confidence, independence, and mental health, respectively.

In a previous study, it was showed that 65% of EC were unhappy⁽²⁹⁾. Morison⁽³⁰⁾ identified that the majority of bedwetting children were embarrassed and worried because of their bedwetting problem, and especially those with perceived hopelessness were less engaged in treatment and lost heart in a short time. When associated studies are reviewed, it is seen that bedwetting children develop more negative feelings than those not bedwetting⁽²⁰⁾, level of self-esteem in bedwetting children are lower than the general population⁽⁹⁾, and psychological problems slightly increase in the case of EC^(17,29), whereas a study comparing EC with healthy children showed no psychological difference between the enuretic and non-enuretic groups⁽²⁹⁾.

During in-depth interviews made in the present study, all of EC expressed embarrassment, sadness, inconvenience, fear of being exposed to peers; and almost all of them expressed dispiritedness/unhappiness and fear of being mocked and teased. In addition, there were children who expressed anger, guilt, fear of drawing peers away / being left alone, smelling of urine and staining their clothes, and negative feelings arising from this problem.

Children stated that they did not accept sleepover invitations because of enuresis, they experienced problems and fear of wetting themselves during school trips, vacations or travels, and, therefore, their participation in overnight activities was limited, and, if they participated, they would change underwear and clothes, they would not drink water, tea, etc. at night, they would visit the bathroom frequently, and they would not sleep well. It is reported that parents are concerned about the effect of enuresis on their child's social and emotional development^(7,14), however, most children are frustrated in response to attending to one's hygiene and do more laundry^(23,29).

Parents need to be reassured that bedwetting is not due to a child's laziness but beyond his/her control^(3,30). It is argued that a child's management of bedwetting must be individually addressed^(20,23,26).

CONCLUSIONS

In the present study, it is suggested that urinary incontinence is very important health problem in school-age child. To reduce the complaints of this multi-factor problem, the first option can be description and well management of risk factors. In this study, the prevalence

of UI was found to be 8.6%, diurnal UI and secondary enuresis were very common and all children were non-monosymptomatic. UI became less common with age, and considerably high in boys and those who reported frequent urinary infections, history of childhood enuresis among their immediate family members and a low socio-economic status. Enuresis have negative emotional and social effects in school children. School and field screening programs should be conducted with school-age children and information should be gathered from children and parents for diagnosing undisclosed UI in the society, and guidance should be provided about the optimal treatment of children with UI.

ACKNOWLEDGEMENT

This study was supported by The Support Program for Scientific and Technological Research Projects of TU-BITAK (Program Code: 1001 Project No: 107S062).

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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